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evaporated, and the residue, consisting of nearly pure theine, was dried and weighed. The results obtained were as follows:

No. 1, at 90 cents per pound	2.73	per cent. theine
" 2, " 60 " " "	3.67	" " "
" 3, " 70 " " "	3.10	" " "
" 4, " 25 " " "	2.14	" " "
" 5, " 70 " " "	2.69	" " "
" 6, " 40 " " "	2.49	" " "
" 7, " 65 " " "	2.53	" " "
" 8, " 70 " " "	3.05	" " "
" 9, " 50 " " "	2.12	" " "
" 10, " 20 " " "	2.09	" " "
" 11, " 20 " " "	2.21	" " "

It would appear from the foregoing that there is no fixed relation between the commercial value of tea and its alkaloidal strength. A tea, for example, at 20 cents per pound, has more alkaloid present than one at 50 cents per pound; and one at 90 cents per pound has less of theine represented than one selling at 60 cents per pound. From a *medical* point of view, this determination is of practical value, for, contrary to the general belief, physiologically considered, a tea (being valuable only in the proportion of alkaloid present) is valuable or not regardless of commercial consideration.

THE QUALITY OF COMMERCIAL PEPPERS.

BY PROF. L. E. SAYRE,
Department of Pharmacy, Kansas State University.

There seems to be a wide difference of opinion as to the extent of adulteration of ground spices. Some hold that it is a difficult matter to obtain a pure spice in common use as condiment, and others, equally good authorities, hold that, when ordinary care is used in purchasing, it will be found that adulteration is the exception rather than the rule.

To determine which of these two views is the correct one, will require much more time than I have been able to give to the subject; but I have made examination of a number of samples of the most familiar and largely used of all condiments—black pepper—with a view of contributing something in this direction. Accordingly, ten samples were obtained in open market, care being taken to not duplicate brands, and to get a fair average of pepper from different sources sold in the retail stores. These were all subjected to the same process of analysis.

Before stating the result, it may be well to say that in the examination special stress was laid upon the amount and character of the fixed residue, remaining after the evaporation of an ethereal percolate.

It is well known that an ethereal percolate of ground pepper contains in solution, almost wholly, *volatile oil*, *resin*, and the alkaloid *piperine*.

It may also be known that the evaporated residue (the fixed residue) contains resin and piperine, the volatile oil having escaped during evaporation.

The determination of ash and moisture is desirable, but not to be depended upon as a method of estimating value. An excess of ash would indicate, possibly, sand or earthy matter, but starch could not be detected by incineration. As to the determination of moisture, no reliance need be placed upon the determination of this constituent, for pure pepper may vary greatly in this respect, containing from 12 to 9 per cent. of water.

As stated previously, I have laid more stress upon the evaporated ethereal extract, believing this data to be a surer index of power, taken by itself, than any other. I

have made, however, all three of the above determinations: namely, moisture, oleo-resin (evaporated ethereal extract), and ash. In some cases these three data, taken together, are necessary in determining values.

According to Mr. Bell, *American Journal of Pharmacy*, Oct. 1888, the appearance of the evaporated ethereal extract must be carefully noted, as it affords an excellent clue to possible adulteration. It should be dry, somewhat scaly, and the resin should show numerous projecting crystals of piperine. If it has a dark, oily appearance and is mostly amorphous, adulteration is indicated.

I may add that it is not only a *dark* coloration of the residue that indicates adulteration, but if the color is of a very *reddish* hue in thin layers, the indication is, presence of capsicum, (added, doubtless, to give pungency to the inert adulterant.)

The result of the examination is as follows:

	<i>Moisture.</i>	<i>Resin and piperine.</i>	<i>Ash.</i>
No. 1	10.43	4.6	5.5
No. 2	10.34	10.3	2.5
No. 3	14.25	7.3	2.
No. 4	9.75	7.9	5.
No. 5	Lost.	5.1	1.5
No. 6	11.20	7.8	7.
No. 7	7.10	7.2	2.5
No. 8	11.25	4.9	2.5
No. 9	10.78	6.6	3.
No. 10	9.80	5.9	3.

In conclusion, I would say that a physical examination is quite essential to a satisfactory analysis of pepper. This I have not as yet made, because I have yet to select the adulterated specimens of other samples, and then, by microscopic examination, determine the kind of adulterants used. This can be done very largely by physical examination.

ANIMAL ETHICS.

BY A. H. THOMPSON, TOPEKA, KANSAS.

The following brief contribution to the study of animal ethics, comparative ethics, or morals among animals, is submitted without comment upon the more elaborate studies of the subject that may have been made by the masters in natural science, but is presented merely as amateur browsings in a very interesting field of psychological research.

At the outset we are met by the query: Do animals possess a morality at all? Do they ever distinguish between right and wrong, between justice and injustice, kindness and cruelty, honesty and dishonesty, vice and virtue, and other moral attributes, among and between themselves? Do they have any respect for the rights of others? Do they ever attempt to control their own selfish impulses for the good of others, or for the good of an animal community? Let us make a study of their moral manifestations, and endeavor to obtain an answer to these queries.

A great difficulty confronts us at the beginning of our investigations by the apparently complete absence of similarity or sympathy between the mental processes and reasoning actions of the lower animals and of man. Not only is the nervous organization of man of a much higher grade, and his mental powers consequently much superior, but the methods of his mind are of a very different order. Both in quantity and quality of psychic processes he varies infinitely from the other animals around him, so that he has little in common with them. But yet his mind, with his nervous organization and his physical body, must have ascended through ages of animal ancestry to its present supreme position. The process of evolution has pro-